



Rebuttal Report (to Dr. Beaman) of Joe Davis

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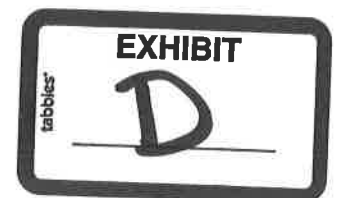
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1.0 INTRODUCTION

I, Joseph B. Davis, on behalf of Plaintiffs L.C. Eldridge Sales Co., Ltd. and Leseman Davis LLC, submit this expert report in response to the report of Professor Joseph J. Beaman, Jr., dated March 11, 2013, entitled "Expert Report of Joseph J. Beaman, Jr., on Patent Invalidity."

My report summarizes my opinions based on my understanding as an expert in the field, my education, training, research, knowledge, personal and professional experience, and my review and analysis of the references cited and discussed in Professor Beaman's report. If called at trial to testify as to the contents of this report, I am able and willing to testify truthfully and competently about it. I submit this expert report pursuant to Federal Rule of Civil Procedure 26(a)(2)(B) and the Court's Scheduling Order currently in place.

2.0 BACKGROUND AND QUALIFICATIONS / JOSEPH B. DAVIS PROFILE

I am one of the two named inventors on U.S. Patent No. 7,707,828 ("the '828 Patent"). I am also Manager of Leseman Davis, LLC, the current Assignee of the '828 Patent and Vice President and General Manager of L.C. Eldridge Sales Co., LTD (Eldridge). I have been employed by Eldridge for fifteen years and have held my current position for seven years.

I hold a Bachelor of Science Degree from Grantham University in Engineering Management. Prior to Eldridge I worked for Universal Silencer for ten years, Perry Equipment Corporation for four years, and Fluor Engineers and Constructors for four years. I have worked in the Oil and Gas industry for thirty-three years of my career, Locomotive industry for five years, Power industry for twenty-three years, Process industry for thirty-three years, Wastewater industry for twenty-five years, Industrial Building industry for fifteen years, and the Marine industry for fifteen years. During my employment with Perry Equipment Corporation I worked as an Application Engineer sizing and designing filters and filter-separators for operation in natural gas and liquid applications and I became proficient

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in calculating pressures and effects of fluid-flow. During my employment with Universal Silencer I was Manager of Application Engineering. At Universal I was responsible for fluid-flow calculations and acoustic evaluations that were specific to industrial silencers used on high pressure gas/steam vents, positive displacement blowers, reciprocating engines and combustion turbines. At Eldridge I am responsible for acoustic and fluid-flow engineering and design specific to mobile offshore drilling rigs and other critical industrial ventilation applications which requires daily application of all the above mentioned science and skills.

3.0 LEGAL PRINCIPLES

I have reviewed and believe I understand the discussion of patent law set forth on pages 5-9 of Professor Beaman's report. Like Professor Beaman, I am not a lawyer. However, I understand this portion of his report to have made at least two omissions.

On page 6, Professor Beaman writes:

I understand that, in conjunction with the interpretation of the claims themselves, the following three factors are used to guide the determination of whether a patented invention is obvious: (1) the scope and content of the prior art, (2) the level of skill of a person of ordinary skill in the relevant art, (3) the differences between the claimed invention and the prior art and whether the claimed invention would have been obvious to one of ordinary skill in the art in light of those differences.

I understand Professor Beaman to have omitted a fourth factor, namely, objective considerations of nonobviousness. It is my understanding that the law on this point has been set forth in the following manner: "Obviousness is a question of law based on underlying factual findings: (1) the scope and content of the prior art; (2) the differences between the claims and the prior art; (3) the level of ordinary skill in the art; and (4) objective considerations of nonobviousness." I further understand that examples of objective considerations of nonobviousness include, for example, whether a claimed invention has enjoyed commercial success, whether it has satisfied long-felt but previously unsolved needs, and whether others previously have tried, but failed, to solve the problems that the claimed invention solved.

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Additionally, I understand that it remains the law, even after the *KSR* case, that “[g]enerally, a party seeking to invalidate a patent as obvious must demonstrate by clear and convincing evidence that a skilled artisan would have been motivated to combine the teaching of the prior art references to achieve the claimed invention, and that the skilled artisan would have had a reasonable expectation of success in doing so.” As I read the discussion in pages 5-9 of Professor Beaman’s report, it seems to me that he downplays the importance of providing a motivation to combine the teaching of the prior art references to achieve the claimed invention, and as I understand it, that is the law.

4.0 LEVEL OF ORDINARY SKILL IN THE ART

I have reviewed Professor Beaman’s opinion as to the level of ordinary skill in the art set forth on pages 13-14 of his report.

Professor Beaman is correct that the ‘828 Patent was filed with the Patent Office on December 8, 2006, and that the ‘828 Patent is a continuation-in-part of U.S. Patent Application No. 11/307,712, which was filed with the Patent Office on February 17, 2006. He is correct that the ‘828 Patent also claims priority to provisional patent application No. 60/751,459, which was filed with the Patent Office on December 19, 2005.

Professor Beaman’s opinion is that the level of ordinary skill in the art as of any of these dates—December 19, 2005, February 17, 2006, and/or December 8, 2006—was that of a person holding a Bachelor of Science in Mechanical Engineering, or “hav[ing] been a technical designer in exhaust and ventilation systems with 3 to 5 years of experience.”

I believe that one of ordinary skill in the art in late 2005 through 2006 was that of a person holding a bachelors’ degree in either engineering or engineering management, and/or having 5 to 10 years of experience in designing exhaust and ventilation systems.

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5.0 DESCRIPTION OF THE '828 PATENT

I have reviewed Professor Beaman's description of the '828 Patent, and its prosecution history, set forth on pages 14-18 of his report.

On pages 14-15, Professor Beaman writes "It is noted in the specification that at full load the exhaust gas has higher velocity than at lower loads and system design criteria should be set for low load exit velocity. It may be desired to decrease the pressurization system output at these high loads. Additionally, at low speed it might be desirous to run the pressurization system at higher output." This reads a bit ambiguously to me. My response is that an axial flow fan works by following its flow and pressure curve in tandem with the variation of forced engine exhaust as they combine and pass through an exit nozzle. A fan will move more air when the nozzle pressure is reduced, which is the case at low engine load; the opposite is true at high engine load. The greatest amount of fan pressure is required across the nozzle, at high engine load, which is also the point on the fan curve of lower fan flow. Less fan pressure is required across the nozzle at lower engine load, which is also the point on the fan curve of highest fan flow. If, as Professor Beaman appears to suggest, the system of the '828 Patent were sized at low engine load with the highest fan flow and pressure, the result would be that at high engine load, when nozzle pressure increases, the fan most likely would not be moving much air at all, resulting in reduced dilution. So, I disagree with what I understand Professor Beaman to be suggesting, that is, the assertion that if velocity and dilution are most desirable at low engine load, the starting point for design should be the low engine load rather than the high engine load. This could be done, perhaps, but would take longer; also, I believe it preferable to know the maximum engine flow and temperature at full engine load, to be sure that the exit velocity from the system of the '828 Patent will meet or exceed this condition. Knowing how an axial fan works, the back side of the equation can easily be checked at lower engine loads.

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Professor Beaman's description of the prosecution history is not quite accurate, for at

least the following reasons:

- Provisional application No. 60/751,459 was filed with the Patent Office on December 19, 2005, rather than ten days earlier;
- The information disclosure statement referenced on pages 15-16 of Professor Beaman's report was filed May 23, 2007 rather than December 8, 2006;
- The information disclosure statement that was filed with the Patent Office did contain a two-paragraph English-language abstract of the Nakagami reference (this can be seen on LCE 000813);
- In the December 12, 2007 Reply to Office Action, the Examiner's reliance on the Boehme reference also was challenged. One challenge asserted that the Boehme reference was "non-analogous art" because it was "directed to using the flywheel of an internal combustion engine as an air pump for injecting air into an aspirator 4 thereby increasing the available oxygen in the exhaust gases for thermal or catalytic conversion of exhaust emissions." Another challenge asserted that the Boehme reference taught away from the claimed invention because it taught placement of the "aspirator 4" upstream of the converter and presumably of any muffler, rather than teaching the placement of the aspirator at the terminal portion of an exhaust pipe;
- In the September 24, 2008 Office Action, the Examiner did not assert that all of the remaining claims were obvious in view of the Nakagami, Hamblin and Lewis references, but rather, (1) asserted that remaining claims 7, 8, 31 and 32 were obvious in view of Nakagami, Hamblin (which the Examiner referred to as Sheffer, though Professor Beaman correctly notes that Hamblin is the first-named inventor) and **Endres**, and then (2) asserted that remaining claims 21 and 44 were obvious in view of Nakagami, Hamblin and Lewis;
- In the January 26, 2009 response, no argument was made that the claimed invention was a stationary structure, but rather, that the claimed invention was for use in "manipulating engine exhaust gasses away from a stationary structure, such as, but [not] limited to, an offshore drilling rig" and "the apparatus or method is associated with a 'stationary structure' and that the apparatus manipulates engine exhaust away from the stationary structure";
- In Professor Beaman's discussion of the June 30, 2009 amendment after Final Office Action, he asserts "The applicants retracted their arguments regarding the invention being a stationary structure...." This is inaccurate because, as shown above, no arguments ever were made that the invention was a stationary structure; rather, the previous arguments were that the invention was "associated with a stationary structure" and used to manipulate engine exhaust gasses away from a stationary structure. It would be more accurate to recite the retraction as it was made:

At any rate, Assignee understands the Office to be giving no weight to the previous limitations and arguments regarding a stationary structure. Therefore, Assignee has removed such

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limitations. Furthermore, Assignee hereby expressly retracts its previous arguments with respect to the previously presented claim limitations regarding a stationary structure in accordance with *Hakim v. Canon Avent Group PLC*, 479 F.3d 313, 81 U.S.P.Q.2d (BNA) 1900 (Fed. Cir. 2007).

In addition to the above clarifications, I would add that I believe the claims that issued in the '828 Patent received a thorough examination by Examiner Tran, who considered them several times in view of several prior art references, before finally allowing them.

6.0 THE CLAIMS OF THE '828 PATENT ARE VALID OVER THE PRIOR ART DISCUSSED IN DR. BEAMAN'S CHARTS¹

As an initial matter, I note that in the summary of opinions Professor Beaman lists on pages 80-82 of his report, all but eight of them are completely new invalidity arguments that none of defendants disclosed in their invalidity contentions. Indeed, two of the references relied upon by Professor Beaman were not included in the contentions at all. I understand this is contrary to the Local Patent Rules of the Eastern District of Texas. This limited my time to review and understand those arguments and references, and interfered with my ability to form my opinions. Although I have offered my opinions in this report on those new arguments and references advanced by Professor Beaman, my understanding is that this Court should not allow Professor Beaman to rely on those previously undisclosed arguments and references before the jury.

Before discussing my analysis of the charts in pages 35-80 of Professor Beaman's report, I offer the following comments regarding how the invention of the '828 Patent solved a long-unmet need, met with commercial success, and represented a solution to a problem

¹ I noticed that Professor Beaman's report includes not only the charts of section IX specifically applying prior art references to the claims of the '828 Patent, but also a section V entitled "Scope and Content of the Prior Art" and another section VIII entitled "Description of the Asserted Prior Art." In my report, in an effort to be concise and to avoid redundancy or confusion, I have responded to Professor Beaman's comments on the prior art in a single section, and thus have not dedicated a separate section to responding to Professor Beaman's sections V and VIII. I reserve the right to separately respond to either of Professor Beaman's section V or VIII if they are asserted to contain arguments not found in the charts of Professor Beaman's section IX.

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that others had tried but failed to solve. I believe these comments are relevant to secondary considerations of non-obviousness.

In 2005 GlobalSantaFe came to Eldridge with a problem they were experiencing on their Development Driller I and Development Driller II drilling rigs. They explained that engine exhaust (from the eight diesel engines on each rig) was blowing back on the rig and coating everything on the side of the rig with diesel exhaust soot. The three individuals with GlobalSantaFe in the meeting said that the customer leasing the drilling rig had given them 30 days to find a solution to this problem or the customer would cancel their multi-year drilling contract. Clearly, this was an important issue that needed attention for GlobalSantaFe. The three individuals stated that they had contacted everyone they could think of and no one had a solution. They stated that they had contacted the Jurong shipyard (the builder of the two rigs) and Jurong did not have a solution. They contacted Caterpillar (the builder of the diesel engines) and Caterpillar also did not have a solution. These individuals, and Eldridge, had a previous history in which Eldridge had solved problems for them before; as a result, they consulted Eldridge for a solution. I combined my experience with engine exhaust silencers and marine fans, and developed a solution for GlobalSantaFe that later would be the subject of the '828 Patent.

This invention was a significant development because diesel engine soot blowing back on offshore drilling rigs had been a problem that existed in the offshore drilling industry since it's beginning over sixty years ago. In an attempt to solve this problem, some customers would place a number of fans around the moon pool, drill floor and other locations on the drilling rigs in an effort to blow the exhaust away from the workers; but this approach was not successful. Others attempted to use water spray in contact with the exhaust pipe exit in an effort to entrain the diesel soot in the water and wash it away; but this approach was not successful. Yet some attempted to route the engine exhaust pipe to locations on the drilling rig where they thought they could use wind direction to blow the diesel exhaust away from

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the drilling rig; but again this did not prove successful and added unwanted backpressure to the engines. The invention of the '828 Patent solved the problem drilling rigs encountered with diesel engine exhaust and it ceased to be an issue. Therefore the invention of the '828 Patent met a need in the industry that could not be met by other solutions.

To date, this invention has proven to be an effective solution for blowing diesel engine exhaust away from every drilling structure on which it has been installed. Eldridge has sold the system for use on semi-submersible drilling rigs, jack-up rigs and a drill ship. In all cases, we understand it has worked effectively and solved the problem that existed in the offshore drilling industry since its beginning over sixty years ago.

Additionally, I have reviewed the charts in pages 35-80 of Professor Beaman's report, and I disagree with his conclusions, as explained below.

I understand Professor Beaman to believe that the invention of the '828 Patent is similar to a jet pump, eductor, or ejector that uses a fan or jet (secondary flow) to impart an increase in velocity to a fluid that basically has little or no initial velocity (primary flow). Regarding an eductor, by design, the combined (primary + secondary) exit velocity will be less than the initial fan velocity (secondary flow) but greater than the initial velocity of the primary flow. In contrast, the system of the '828 Patent combines two positive forced flows, each with a relatively high initial velocity, into a combined flow with an exit velocity that is greater than either the fan (secondary flow) velocity or the engine exhaust (primary flow) velocity alone. Therefore the system of the '828 Patent is not a jet pump, eductor, or ejector, and further, does not function or operate like an eductor at all.

Put another way—for both the eductor and the system of the '828 Patent, the combined **flow** will be greater than the initial primary or secondary flow, but only with the system of the '828 Patent will the combined **velocity** be greater than both the initial primary and secondary velocities.

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For the most part, I read Professor Beaman's obviousness opinions to be mostly conclusory; that is, I read his opinions as stating mostly his conclusion that a particular claim is obvious or that the limitations are "well-known". For the most part, I don't find an explanation from Professor Beaman as to how or why a person of ordinary skill in the art would arrive at the system of the '828 Patent. I think Professor Beaman mainly tries to find each element of the claims of the '828 Patent somewhere in the prior art, and then concludes that the claims are obvious, without explaining, for example, why one a person of ordinary skill in the art would be motivated to combine the prior art references or have a reasonable expectation of success from doing so. As I understand the law, he's required to have done that, and has not done so.

I disagree with Professor Beaman that one of ordinary skill in the art would understand a mobile object, such as an aircraft, to be a "structure" within the meaning of the claims of the '828 Patent. Professor Beaman seems to take this position in several places—for example, p. 35, where he writes "One of ordinary skill would understand an aircraft to be a structure"—and in each instance, I disagree that one of ordinary skill in the art would understand the claims of the '828 Patent to be using the term "structure" to describe a mobile object.

The Lewis '501 Patent

I disagree that Lewis '501 anticipates claims 1, 2, 4, 5, 11, 12, 16, 17, 20, and 25-28 as concluded by Professor Beaman.

The Lewis '501 system is different from the '828 patent because Lewis '501 includes a blower on the outlet in every single figure in the patent. This sucks the fluid through the system. Such a system will not function without that outlet blower. In Figure 9 of Lewis '501, the embodiment includes a blower on dilution air provided to achieve higher dilution ratios. There is no discussion of achieving a velocity to blow away--in fact, Lewis '501 suggests attempting to achieve a pressure of zero at the mixing point and therefore only

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works with outlet blower sucking on the system. Using a blower to suck the fluid of the exhaust system out is a different approach than the invention disclosed in the '828 patent. By depending on a separate blower in the exhaust stream, Lewis '501 teaches away from the invention of the '828 patent that solves the engine exhaust discharge problems of drilling rigs without using additional blowers.

Lewis '501 relies on precise equipment for measuring accurately contents of an exhaust stream. This is a system that is very different from an industrial application and harsh environment of a drilling rig as is the application for the '828 patent. In my opinion, this is a further reason that Lewis '501 is non-analogous art to the '828 patent.

Professor Beaman recognizes that Lewis '501 is directed to "analyzing the exhaust from a motor vehicle." As explained below, vehicle exhaust systems have a very different set of design parameters and objections that are not the same as those when dealing with a structure.

Because in my opinion, Lewis '501 is non-analogous art, it would not be looked to for combination with other references or what is "well known" in the art, as is the basis for Professor Beaman's obviousness opinion. Therefore, I disagree that one of ordinary skill in the art would combine other references with Lewis '501 to arrive at claims 13, 18, 29-52 as concluded by Professor Beaman. In addition, for similar reasons, I disagree with Professor Beaman that the "anticipated claims . . . [are] invalid by obviousness when combined with common knowledge and ordinary skill in the art"; thus I conclude claims 1, 2, 4, 5, 11, 12, 14, 15, 16, 17, 20, 23, 24, 25-28 are not invalid as obvious.

As discussed above, I do not believe that one of ordinary skill in the art would understand the term "structure" as used in the claims of the '828 Patent to mean a motor vehicle. Designing an exhaust system for a motor vehicle is very different from designing one for a structure. The movement of a vehicle creates a different set of design criteria such that it is not proper to attempt to interchange designs for motor vehicles with those for

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structures. The claims require the engine to be on the structure; an engine on a motor vehicle is a different set of problems and for at least this reason motor vehicle exhaust systems are non-analogous art.

Lewis '501 teaches nothing about manipulating exhaust gas away from any structure or vehicle. The only teaching possible to derive from Lewis '501 is to use piping to locate the exhaust outlet at a desired location. Lewis '501 therefore, teaches away from the solution of the '828 Patent that teaches a solution that does not require the use of extended exhaust piping, which as discussed above, had been attempted by others in the field and did not solve the problem facing GlobalSantaFe. Indeed, such additional piping has a design drawback of increasing the backpressure in the exhaust system, which has a negative performance impact.

I understand Professor Beaman to believe that Lewis '501 anticipates claim 1, but at the same time to admits that Lewis '501 does not teach direct coupling of the terminal portion of an exhaust pipe to a housing. I agree that Lewis '501 does not disclose this element. However, I disagree with Professor Beaman that this "indirect coupling" is a "predictable variation" to arrive at the '828 patent for at least two reasons. First, the addition of extra piping to achieve his "indirect coupling" would have the same design drawback of additional backpressure I identified above. Moreover, Professor Beaman's "indirect coupling" theory is only possible because in all embodiments Lewis '501 includes a blower on the outlet to suck the air through the system. This design, which is necessary to allow the system in Lewis '501 to function, is significantly more expensive than the elegant solution of the '828 Patent because it requires an additional blower, significantly increasing the cost of the exhaust system.

I disagree with Professor Beaman that it is inherent in Lewis '501 that the "combined exhaust and dilution air" necessarily exits at a greater velocity. The velocity of the fluid in

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the piping depends of the pressure, temperature, and volume of the pipe. Without any data on those variables within Lewis '501, it is impossible to determine what the velocity of any flow in the Lewis '501 system would be. Indeed, one can very easily envision a system of the Lewis '501 patent that would result in a lower second velocity. Therefore, Lewis '501 cannot inherently meet the second velocity greater than the first velocity element.

I disagree with Professor Beaman that Lewis '501 discloses an "air pressurization system." The Lewis '501 patent teaches away from using a blower on an air inlet to create air pressure. The Lewis '501 patent expressly teaches that the blower on the outlet creates a vacuum on the system, which is the opposite of pressurization. (Lewis '501 4:39-42; 5:37-41.)

As to claim 4, I further disagree with Professor Beaman that Lewis '501 discloses an annular region. I have reviewed the portions of the reference cited by Professor Beaman and they do not disclose anything regarding the configuration and whether an annular region is created.

As to claim 5, I further disagree with Professor Beaman that Lewis '501 discloses an exit portion of the housing as a converging nozzle. As discussed above, Lewis '501 requires the use of a blower at the outlet of the exhaust system. Using a blower at the outlet is different from using a converging nozzle.

As to claim 16, I disagree with Professor Beaman that Lewis '501 discloses entraining exhaust gases. Lewis '501 discusses only diluting the exhaust; Lewis makes no mention of entraining exhaust gases. This makes sense as Lewis '501 is directed to an analyzer system designed to measure a sample of mixed gases. By seeking to achieve complete mixing of gases, which is a different design goal than entraining one fluid in another, Lewis '501 teaches away from entraining exhaust gases.

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As to claim 17, I further disagree with Professor Beaman that Lewis '501 discloses the step of "determining how much pressurization from the air pressurization is needed to adequately manipulate the exhaust gases," because Lewis '501 does not contemplate manipulating exhaust gases in any way analogous to the '828 Patent. As discussed above, Lewis '501 is an analyzer system for controlling pressure within the system and is not concerned with manipulating the exhaust gas for any other purpose. Moreover, the use of the exhaust blower in Lewis '501 is incompatible with the '828 Patent's system of claim 17.

As to claim 28, I further disagree with Professor Beaman that the sampling zone temperature in Lewis '501 is the same as the "exhaust temperature" in the claim.

As to claim 29, it reads to me as though Professor Beaman does not even address the element that the "discharge portion" of the air pressurization system has an "area approximately the same as or more than the annular region area." I see nothing in Lewis '501 that discloses anything regarding the comparative areas of any of the components of the Lewis '501 system.

The Koelm Reference

I read the Koelm reference as disclosing a system designed for a particular type of construction vehicle, namely pavers. This is clear from the opening paragraphs of the patent application, in which the system discusses two flow streams--the internal engine exhaust and the evacuation system. This is very different from systems that are pulling in ambient air to handle an exhaust system. The system of Koelm is non-analogous because of its specific application and not something one of ordinary skill in the art would look to when trying to solve the problems addressed by the '828 patent.

Moreover, Koelm is attempting to solve the problem of exhaust noise and address pressure pulsations of the construction vehicle gas streams. The '828 patent is not analogous to these issues addressed by Koelm. These pressure pulsations are why Koelm includes ports (or holes) in the line, to dampen pressure pulsations. Indeed, Koelm

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describes its benefits as "reducing the number of exhaust pipes or stacks on the vehicle 1 and of reducing the sound level that would otherwise be generated by the engine exhaust gas flow." (Koelm at 2 ¶ 17.)

I disagree that one of ordinary skill in the art would read the term "structure" in the claims of the '828 Patent to include a "construction vehicle," for reasons I've discussed above with regard to Lewis '501 and other portions of my report.

Because in my opinion, Koelm is non-analogous art, it would not be looked to for combination with other references or what is "well known" in the art, as is the basis for Professor Beaman's obviousness opinion. Therefore, I disagree that one of ordinary skill in the art would combine other references with Koelm to arrive at claims 13 or 36 as concluded by Professor Beaman.

More particularly with respect to claim 1 of the '828 Patent, I disagree that Koelm discloses a housing coupled to a terminal portion of an exhaust pipe. In Koelm, almost the entire length of the exhaust pipe is inside the "outer tubular member" upon which Professor Beaman relies. Moreover, the "end" of the exhaust pipe in Koelm is "capped" (Koelm at 5) to force the exhaust gases to bounce back off the cap and out through the side ports. This is a completely different design than the invention of the '828 patent.

I disagree that Koelm discloses a separately motorized ambient air pressurization system. As Koelm makes clear, it is combining two gas streams from the construction vehicle--neither of these are ambient air. Koelm is a different system and is non-analogous to the '828 patent.

Further, one of ordinary skill in the art would not look to combine Koelm and Nakagami. Koelm is attempting to solve a pressure pulsation and noise problem. And Nakagami is also a muffler. Those problems seem different and unrelated to the problems solved by the '828 Patent. Moreover, Professor Beaman provides no reason why one of skill in the art would

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look to these disparate references and combine them when Nakagami has the high speed ambient air of the flying airplane already in use.

Koelm offers no discussion or explanation of the sizes or velocities of any of the fluids. Professor Beaman appears to simply assume that one would take the air flow of a flying airplane on the Nakagami muffler and use the blower of Koelm to attempt to create similar conditions. I disagree that any theory under a heading of "common sense" supports Professor Beaman's assumption. Neither did I see any articulation by Professor Beaman of any motivation, teaching, or suggestion leading to his result.

As to claim 5 of the '828 Patent, Professor Beaman offers no theory of "common sense" nor articulation of any motivation, teaching, or suggestion leading to his result that this claim is obvious in view of Koelm. I disagree that it is. Koelm is solving a different problem and adding a nozzle to the exit portion of a housing increases fluid velocity, which is likely to increase noise--precisely the opposite of what Koelm is trying to accomplish. Therefore, Koelm teaches away from Professor Beaman's unexplained statement.

As to claims 13 and 36 of the '828 Patent, I disagree that Koelm Figures 2 and 3 disclose a ducted axial blower.

As to claim 16 of the '828 Patent, I disagree that Koelm discloses coupling a housing to a terminal portion of an engine exhaust pipe, as discussed above in claim 1.

I disagree that Koelm discloses injecting air from a separately motorized air pressurization system into a housing; entraining the exhaust gases with the injected air. Koelm discloses exhaust gases "in a cross-flow" to promote turbulence to interfere with the sound-causing pressure pulsations. A turbulence-inducing cross flow is the opposite of entraining a flow, and Koelm therefore teaches away from the invention of the '828 patent. Moreover, as discussed above regarding Claim 1, Koelm teaches a "cap" on the exhaust flow to further increase collusions and turbulence.

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Again I disagree with Professor Beaman that a person of ordinary skill in the art would look to combine the airplane muffler of Nakagami with the construction vehicle noise-reduction system of Koelm.

As to claim 39 of the '828 Patent, as I discussed above in respect to claim 1, I disagree that Koelm discloses a structure.

Professor Beaman appears to not even address the element that the "discharge portion" of the air pressurization system has an "area approximately the same as or more than the annular region area." I see nothing in Koelm that discloses anything regarding the comparative areas of any of the components of the Koelm muffler.

As discussed above in claim 16, I disagree that Koelm discloses entraining exhaust gases.

As to claims 51 and 52 of the '828 Patent, as I discussed above in respect to claim 1, I disagree with Professor Beaman's opinions regarding the velocity of the expelled combined fluid. I see nothing in Koelm that discloses anything regarding the comparative areas of any of the components of the Koelm muffler. I further disagree with Professor Beaman's opinion regarding one of ordinary skill looking to combine the muffler from Nakagami with the construction vehicle noise-reduction apparatus of Koelm to arrive at the invention of the '828 patent.

Further to claim 52, as I discussed above in claim 1, I disagree with Professor Beaman's opinions regarding the velocity of the expelled combined fluid.

The Gans Reference

I disagree with Professor Beaman that Gans is prior art to the '828 patent. The publication date of Gans is after filing of the parent application and provisional application.

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Professor Beaman makes no effort to show that the '878 patent is not entitled to the priority date of its parent application and/or provisional application.

Gans is focused entirely on dilution of pollutants to avoid odor detection. This is a different field from the industry engine exhaust problems on a drill rig addressed by the '828 patent. Gans is therefore non-analogous art.

Professor Beaman offers no explanation as to why one of ordinary skill in the art would look to the non-analogous art field of odor control for chemical facilities near residential neighborhoods. Notably, nowhere in the '828 patent does it discuss "odor" elimination or controlling odor level below detection. Simply put, Gans is discussing and addresses a different problem than the '828 patent.

I disagree with Professor Beaman's conclusion that Gans can be combined with other references to render obvious claims 18, 25, 44, and 47.

Regarding claims 5, 16, 29, 39, 51 and 52 of the '828 Patent, I disagree with Professor Beaman that Gans discloses an exit portion of a housing that is a converging nozzle. Gans discloses a fan that discharges directly to atmosphere. Any mixing is done in the fan itself and is immediately discharged.

Regarding claims 17, 43 and 44 of the '8282 Patent, I disagree that Gans discloses determining how much pressurization from an air pressurization system is needed to adequately manipulate the exhaust gases. Gans discusses the meteorological conditions or the "several key design parameters" relied upon by Professor Beaman in a bullet list immediately following the quoted language. None of those design parameters discuss pressurization of any system; all relate to a fan discharging directly to atmosphere. Moreover, one of ordinary skill in the art would understand "design parameters" to be considerations for an engineer to use when sizing components of the system to make sure a

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system can handle the expected range of conditions the system may experience. This is different from the "determining" limitations of claims 17 and 43 that reflect a dynamic response to current conditions during operation.

Regarding claim 18 of the '828 Patent, as discussed above on Claim 1, Professor Beaman offers no explanation as to why one of ordinary skill in the art would look to the non-analogous art field of odor control for chemical facilities near residential neighborhoods. Notably, nowhere in the '828 patent does it discuss "odor" elimination or controlling odor level below detection. Simply put, Gans is discussing and addresses a different problem than the '828 patent.

Regarding claims 25 and 47 of the '828 Patent, I disagree that Gans discloses adjusting pressurization based on engine speed and one or more conditions. Gans discusses the non-analogous art field of odor control for chemical facilities near residential neighborhoods. Gans makes no mention of engine speed at all.

Regarding claims 25, 27, 28, 47, 49 and 50 of the '828 Patent, I disagree that Gans discloses adjusting the amount of air injected based one or more conditions, like the "meteorological conditions" upon which Professor Beaman relies, are "design parameters." As explained above, "design parameters" are different from the "adjusting" limitations of claims 27 and 28.

The Edwards Reference

I don't agree with Professor Beaman's conclusion, stated at the top of page 37 of his report, that the heating apparatus of the Edwards reference anticipates the claims of the '828 Patent. I think it highly unlikely that anyone could see a household furnace and arrive at the invention of the claims of the '828 Patent.

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Edwards is directed to a draft control system that is included in part of a residential home furnace system. I disagree that one of ordinary skill in the art would look to household furnace systems when trying to solve problems for engines on industrial drill rig structures.

I disagree with Professor Beaman that Edwards anticipates claims 1, 3-8, 16, and 19-22.

I further disagree with Professor Beaman that Edwards in combination with other references renders claims 9, 10, 13, 18, 23-22, 29-36, 39-41, 43-45, and 47-52 of the '828 obvious. And I disagree that Edwards combined with what is "well known" in the art renders claims 1, 3-8, 14, 15, 16, 19-24, 37, 38, 42, and 46 of the '828 patent obvious.

As to claims 1, 5, 16, 29, 39, 51 and 52 of the '828 Patent, Edwards does not disclose using its system with an engine. Edwards is a system designed for a household heating furnace. I disagree that one of ordinary skill in the art would consider "exhaust from household heating devices to be analogous to engine exhaust."

I disagree with Professor Beaman that Edwards discloses a housing or conduit "coupled to a terminal portion of an exhaust pipe." Professor Beaman relies upon "smoke pipe 10" as the housing and coupled to a terminal end of an "exhaust member 11." As Edwards states, member 11 is "a sufficient distance in advance of the chimney opening" and thus cannot be at the terminal end of an exhaust pipe. Indeed, Edwards teaches away from such a design.

I disagree with Professor Beaman that Edwards discloses expelling or discharging a combined fluid stream at a greater velocity "than the first velocity and away from the structure." This is because Edwards is designed for use in household service with a furnace and is designed to deal with "cold startup" of that furnace. For this reason, Edwards is designed to insert a system as close to the source (i.e., the furnace) as possible in the system. Thus Edwards teaches away from installations at the discharge point.

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I disagree with Professor Beaman that Edwards discloses a "converging nozzle" as that term is used in the claims 5, 16, 29, 39, 51, and 52 of the '828 patent. Edwards teaches an expansion in the line immediately after the venturi upon which Professor Beaman relies as a "converging nozzle." This expansion reduces the velocity in the line and is not near the discharge of the combined fluids.

As to claims 9-10, 13, 18, 29-38, 40-43 and 44-50 of the '828 Patent, as explained above, I understand Edwards to be non-analogous art to the invention of the '828 patent and therefore would not be looked to by one of ordinary skill in the art for use with engines on an industrial drill rig.

As to claims 19 and 45 of the '828 Patent, I see that Edwards cautions that it is "well known that it is objectionable to have too strong a draft in the chimney, as frequently occurs after the fire has been going in the furnace for some time." Thus Edwards teaches away from the '878 patent and Professor Beaman's simple conclusion that Edwards discloses this limitation because "decreasing the back pressure on the exhaust gas increases the efficiency of the engine." This is because Edwards is designed for a different field of use and does not translate to the field of the '878 patent. Moreover, as discussed above in claim 1, Edwards does not disclose an engine.

As to claim 39 of the '828 Patent, as I discussed above regarding claim 1, Edwards does not disclose using its system with an engine. Edwards is a system designed for a household heating furnace. As explained above, I disagree that one of ordinary skill in the art would consider "exhaust from household heating devices to be analogous to engine exhaust."

I disagree with Professor Beaman that Edwards discloses "expelling the combined fluid from the body and directly into the atmosphere." Professor Beaman relies upon "smoke pipe" for this limitation, but as Edwards states, member 11 is "a sufficient distance in

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advance of the chimney opening" and thus is not "expelling the combined fluid from the body and directly into the atmosphere." Thus, Edwards teaches away from such a design.

The Nakagami Reference

My first observation is that the Nakagami reference was extensively considered during prosecution, and that the claims that issued in the '828 Patent were allowed despite the Examiner's extensive consideration of the Nakagami reference. I do not read Professor Beaman's report as offering any reason why the Examiner would have misread the Nakagami reference or erred in finding the claims of the '828 Patent to be novel and nonobvious over the Nakagami reference.

For conciseness, I will incorporate by reference all arguments made during prosecution as to why Nakagami is nonanalogous art, to why it further is distinguishable from the claims of the '828 Patent, and to why one of ordinary skill in the art would not be motivated to combine Nakagami with any other reference(s) to arrive at the claims of the '828 Patent.

Nakagami, of course, pertains to an airplane, and as stated above I do not believe one of ordinary skill in the art would consider the term "structure" in the '828 Patent's claims to refer to an airplane.

Regarding the claims of the '828 Patent that refer to a portion of the system as having an "area approximately the same as" or "substantially equal to" another portion of the system (for example claims 6, 29, 39, 51 and 52) I see nothing in Nakagami that discloses anything regarding the comparative areas of any of the components of the Nakagami apparatus.

As to claim 16 of the '828 Patent, I disagree with Professor Beaman's assertion on page 48 of his report that "One of ordinary skill would understand that a pipe inserted into a housing ("body 8") is coupled." Moreover, I read this as inconsistent with Professor

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Beaman's admission in several other places in his report, such as pages 40, 49, 75 and 78-79, where he admits that Nakagami does not disclose such coupling.

The Copen Reference

The Copen reference pertains to a car. As discussed above, I do not believe one of ordinary skill in the art would consider the term "structure" in the '828 Patent's claims to refer to a mobile device like a car or airplane. I also do not agree that one of ordinary skill in the art would be motivated to consult the Copen reference or to combine it with other references to arrive at the claims of the '828 Patent.

Additionally, I read the Copen reference as being extensively concerned about reducing back pressure. To the extent Professor Beaman views the Copen reference as something he asserts against the claims of the '828 Patent that include a converging nozzle, I think Copen teaches away from such claims, because a converging nozzle can create back pressure by reducing the cross-sectional area through which the combined streams must flow to exit the system. I do not find any of the figures in the Copen reference to include a converging nozzle, and I think a converging nozzle would have been avoided at all costs by Dennis Copen in the system that is the subject of his patent.

The Lewis '539 Patent

My first observation is that the Lewis '539 Patent was considered on several occasions by the Examiner during prosecution, and that the claims that issued in the '828 Patent were allowed despite the Examiner's repeated consideration of the Lewis '539 Patent. I do not read Professor Beaman's report as offering any reason why the Examiner would have misread the Lewis '539 Patent or erred in finding the claims of the '828 Patent to be novel and nonobvious over the Lewis '539 Patent.

For conciseness, and consistency with my approach to the Nakagami reference that also was considered by the Examiner on more than one occasion during prosecution, I will

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incorporate by reference all arguments made during prosecution as to why the Lewis '539 Patent is nonanalogous art, to why it further is distinguishable from the claims of the '828 Patent, and to why one of ordinary skill in the art would not be motivated to combine the Lewis '539 Patent with any other reference(s) to arrive at the claims of the '828 Patent.

The Lewis '539 Patent, of course, pertains to a car, and as stated above I do not believe one of ordinary skill in the art would consider the term "structure" in the '828 Patent's claims to refer to a car.

Regarding claims 17 and 43 of the '828 Patent, I do not agree that the portions of the Lewis '539 Patent that Professor Beaman recites meet the elements of these claims. It is not clear to me that the recitation in the Lewis '539 Patent of computer control of a system that has as one portion of it an air pump teaches using such control to adequately manipulate exhaust gases away from a structure (which Professor Beaman would consider to be a car).

Regarding claim 25 of the '828 Patent, I do not agree that the cited portions of the Lewis '539 Patent teach "adjusting the pressurization based on at least the engine speed and one or more conditions." For example, the portion of the Lewis '539 Patent that is cited as discussing engine speed appears to only disclose calculating exhaust temperature based on engine speed.

The Sourcebook Reference

Claims 9, 34, 35, and others in the '828 Patent recite the use of turning and straightening vanes in connection with the system taught and claimed by the '828 Patent. These vanes were well known at the time of the invention. I would agree that the Sourcebook reference discloses, albeit very briefly, the existence of turning and straightening vanes. I don't read Professor Beaman's report as relying on the Sourcebook for anything else but to evidence

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that the existence of these vanes was known at the time of the invention of the '828 Patent; I agree with that.

The Industrial Ventilation Reference

After reviewing Professor Beaman's report, it is not clear to me exactly which documents Professor Beaman is relying on and describing as the "Industrial Ventilation" reference. I could not find an express citation in his report to any documents that have been produced in the case. It appears to me that he is referring to the following documents—TCF 000480, TCF 000503-505, and AZEN 000468-473—but it is not clear to me if he is relying on and referring to any other documents. If he does refer to and rely on other documents in addition to those recited above, I reserve the right to supplement my report with additional analysis of those documents. Further, I note that if Professor Beaman is relying on more than one document as the "Industrial Ventilation reference," to form his anticipation opinion, as I understand the law on anticipation, that is improper. Anticipation requires a single reference.

The version of "Industrial Ventilation" that we received in connection with Professor Beaman's report does not include a drawing of the garage system referenced in Professor Beaman's report, for example, on p. 36 regarding claim 1 and page 48 regarding claim 16. However, I do possess a later edition of Industrial Ventilation that I believe has the drawing is referred to by Professor Beaman. I have analyzed that edition, and I conclude that the system depicted therein has the exhaust running directly through the fan, which in no way resembles the invention of the '828 Patent. Again, I would like to identify the pages Professor Beaman is referring to and relying on, and reserve the right to supplement my report with additional analysis of those documents once I learn what they are.

I don't agree with Professor Beaman's comment on pages 36-37 of his report, where he writes that "With this teaching [from p.41 of Air Engineering], one of ordinary skill would have

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known that the use of an eductor for manipulating engine exhaust would yield a predictable result. In fact, they would be motivated to use an educator to achieve the desirable results discussed in Air Engineering.” I disagree, because to my knowledge, no-one ever had done this before. If, as Professor Beaman writes, one of ordinary skill would have had this knowledge and this motivation, why had no one done it before?

Regarding pages 38 and 64 of Professor Beaman’s report, I have the referenced pages 31 and 40 of Air Engineering; as to those, I must say that page 31 is a half-column advertisement; is not a clear technical disclosure of exactly what connection, if any, has been made, or what items are connected to each other, and as to page 40, I agree only that the picture’s caption states “Fig. 1: Eductor units on roof of laboratory.” Furthermore, I have not found an analysis from Professor Beaman as to why one of ordinary skill in the art would be motivated to review an article on laboratory eductors to solve the problem on offshore drilling rigs that is solved by the ‘828 Patent.

Regarding page 39 of Professor Beaman’s report, his analysis of the discussion on page 41 of Air Engineering doesn’t identify the engine; rather, the article appears to pertain to gases emitted from laboratories that are passing through eductors on the way to the atmosphere. I disagree with his conclusion that “One of ordinary skill would understand that this intake is a structure through which engine exhaust gases would flow with a velocity.” I again question why one of ordinary skill in the art would be motivated to review an article on laboratory eductors to solve the problem of venting engine exhaust gas from offshore drilling rigs that is solved by the ‘828 Patent.

Regarding page 40 of Professor Beaman’s report, I question his assertion—for which he provides no citation—that in Figure 10-6C (which I presume to be the picture in TCF00480) “[i]n the housing, the contaminated air combines with air injected into the housing by a

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blower at a second velocity.” I see no such disclosure in that Figure (again, presuming we are discussing the same Figure).

Regarding the discussion overlapping pages 40-41 of Professor Beaman’s report (and the similar discussion on page 50 regarding claim 16, page 67 regarding claim 39 and page 79 regarding claim 52), in which he references the Air Engineering article pertaining to laboratory eductors, again I question why one of ordinary skill in the art would be motivated to review an article on laboratory eductors to solve the problem of venting engine exhaust gas from offshore drilling rigs that is solved by the ‘828 Patent. I also would ask Professor Beaman for a cleaner copy of the Air Engineering article, so that I can make sure I’m recognizing the portion of the article he’s referencing. Furthermore, I disagree with his inference that “[o]ne of ordinary skill in the art would then know that the combined air exits the housing at a velocity greater than the velocity at which the contaminated air enters the housing....” The flow certainly will be greater, but the velocity may not.

Regarding claim 3, and the discussion on page 42 of Professor Beaman’s report (and claims 19 and 45 and the discussions on pages 52 and 70 respectively), I again would ask Professor Beaman for a cleaner copy of the Air Engineering article, so that I can make sure I’m recognizing the portion of the article he’s referencing. Second, I note that Professor Beaman himself doesn’t provide a cite or quote to the portion of the article he’s referencing, and as a result it’s not clear to me whether his assertion “[t]his pressure [intake pressure generated by the eductor] is a pump pressure that is generated by the eductor and is a reduction in pressure that would be imposed on the exhaust gas” is his own conclusion or a statement in the article that I couldn’t find. I cannot agree with it until I see a better copy of the article and/or receive further clarification as to what Professor Beaman is referring to here.

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As to claim 7, and the analysis on page 44 of Professor Beaman's report (and claim 32 and the analysis on page 61 of Professor Beaman's report), I note that what I understand Professor Beaman to be calling Fig. 10-6C of Industrial Ventilation (the picture in TCF00480) is not labeled with any of an inlet, a blower or a housing transition. I would like to better understand exactly which components of that drawing are understood by Professor Beaman to represent, in particular, the housing transition before I can agree or disagree with his analysis here.

Regarding the discussion on page 49 of Professor Beaman's report, relevant to claim 16, I again question why one of ordinary skill in the art would be motivated to review an article on laboratory eductors to solve the problem of venting engine exhaust gas from offshore drilling rigs that is solved by the '828 Patent.

Regarding the elements of claims of the '828 Patent that reference a ratio between the area of one portion of the claimed system to another portion of the claimed system (for example claims 39 and 51-52), I see no disclosure in any of the pages I have received from this reference that disclose anything to do with the areas of one part of the system or another, and I do not believe Professor Beaman has identified any such teaching either. I thus do not understand why he has asserted this reference against claim 39 on page 65 of his report or claims 51-52 on pages 75 and 78 of his report. And again I do not believe that one of ordinary skill in the art would be motivated to review an article on laboratory eductors to solve the problem of venting engine exhaust gas from offshore drilling rigs that is solved by the '828 Patent.

Claims 17 and 43 of the '878 Patent Are Not Indefinite

I disagree with Professor Beaman that one of ordinary skill in the art would not be able to determine "how much manipulation is adequate" and that these claims are invalid as

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indefinite.² In my opinion, both the claims themselves and the specification provides guidance to those in the art. For example, claim 17 provides that the manipulation means that the air pressurization is sufficient to discharge the exhaust gases away from a structure. Claim 43 is similar. Further the specification describes how the exhaust gasses are directed sufficiently away from the structure as listed below.


- '828 Patent 1:25-29: "The invention relates generally to manipulating the flow of exhaust gas . . . away from a specific area";
- '828 Patent 1:65-2:3: "The inventions disclosed and taught herein are directed to . . . improving dispersal and dilution of the engine exhaust gas to reduce or prevent contamination of inhabited areas."

The specification further addresses considerations for determining how much pressure is needed to adequately manipulate exhaust gases as shown in the list below,

- '828 Patent 1:48-51: "[L]ow exhaust gas velocity may allow wind and other weather conditions to redirect exhaust gas back toward the exhaust discharge and/or inhabited areas";
- '828 Patent 3:46-52: "Determining how much pressurization from the air pressurization may be needed to adequately disperse the exhaust gases may also be done, as well as determining the current speed of an engine, and/or determining one or more weather conditions."

Therefore, in my opinion, one of ordinary skill in the art is provided a standard or degree for the claims from the claims and the specification. Thus, I disagree with Professor Beaman that claims 17 and 43 are invalid as indefinite.

Respectfully Submitted,



Joe Davis

² Professor Beaman also notes that defendants have argued that claims 29, 29, 51, and 52 are invalid because "body" does not appear in the specification. I do not understand Professor Beaman to be offering an opinion on the validity of those claims on that basis. If he later attempts to offer one, I reserve my right to rebut it at that time.